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ABSTRACT

The author questions why intelligence and intelligence testing have been so lightly treated in recent years. The topic has been in disfavor, and citizens and educators have tended to swing from one extreme to another in their evaluations of such matters of social concerns. This virtual dismissal of intelligence has been followed by great enthusiasm for the concepts of Piaget and the application to classroom learning problems of Piaget's stages in intellectual development. The irony here is that the tasks of Piaget and the tasks of Binet measure the same general factor in intellectual behavior. There is general support in the speech for individualized tracking and for providing the students with the opportunity to dig more deeply into subject matters than is currently provided in the curriculum. Schools cannot deny individual differences in students, and so must begin to offer a variety of programs arranged in a variety of ways. (Author/PC)

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The Importance of Individual Differences

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There are few if any of the recommendations contained in the report by Professor Coleman and others with which I disagree. It would also be unjust to call my comments criticisms. In a very brief report there must be selection of content. Perhaps "important omissions" is a better term than criticisms.

One of the important psychological areas treated quite lightly is intelligence. This topic has been in disfavor in recent years. Our citizens in general and educators in particular tend to swing from one extreme to another in their evaluations of matters of social concern. Measured intelligence never had the overriding importance that it was once considered to have, at one extreme, and it has a good deal more importance than today's evaluation indicates.

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An intelligence test given to all of the children in the neighborhood of a particular grade school before school entrance will predict very accurately the mean level of reading comprehension of the group at the end of the 12th grade. This result is relatively independent of the methods of teaching reading that are used and is probably also relatively independent of the amount of bussing to different schools the children undergo. Prediction of the achievement of individual children is not nearly as accurate as the prediction of group trends, but the degree of accuracy is quite respectable. The individual child's I.Q. is a more accurate predictor than the intelligence, education, occupation, income, or social status generally of the parents. Such facts can hardly be dismissed as lacking in importance. The lack of high validity for social status measures also indicates that highly intelligent children are found living in the most unlikely environments. High and low intelligence are both widely scattered in our society.

What are the reasons for the current neglect? Egalitarian attitudes are more prominent today than a generation ago. These attitudes have perhaps been stimulated by a combination of low mean scores on intelligence tests of several minority groups and strong motivation on the part of many majority group members to accomplish group

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2

equality in education and jobs. Slowness in achieving these goals becomes more acceptable if the construct of intelligence is reevaluated. Reevaluation of curriculum content and teaching methods would undoubtedly be more adaptive, but a reevaluation here accompanied by adequate validation is, I am afraid, proceeding rather slowly.

There is a somewhat amusing aspect of the dismissal of intelligence and intelligence tests by many educators. This dismissal of intelligence has been followed by great enthusiasm for the concepts of Piaget and the application to classroom learning problems of the stages in intellectual development as described by Piaget. The amusement derives from the fact that the tasks of Piaget and the tasks of Binet and Terman measure the same general factor in intellectual behavior, the factor that Spearman called "g." It follows that there is just as much information relevant to the problems of classroom learning available in the tests, grouped by age levels, of the Stanford-Binet as there is from the age levels of the Piagetian tasks.

How did the impression originate that Binet and Piaget were talking about quite different things conceptually? In part, I am afraid, it was based on the use of different terms. Psychologists fail frequently to look closely at the behavior described by different theorists in different ways. In part, also, there is an empirical basis for the confusion. The correlation between passing or failing a single Piaget-type task and Binet intelligence is not high. But few stopped to inquire whether this correlation was appreciably lower than the correlation between two different versions of the Piaget task. The latter is not very high either. In consequence, the Piaget stages of intellectual development are not quite as sharply demarcated as the theory suggests. A child can pass an item at a later stage and fail an item at an earlier stage. Item intercorrelations on all psychological and educational tests are low. Items tend to measure the trait or characteristic for which they were designed in a highly fallible fashion. In part item uniqueness is a consequence of measurement error, but more importantly there is systematic, nonerror variance included as well. This may be specific to the item or to the item type. Only when many items are added together in a total score is there enough common variance

of the attribute the test constructor is trying to measure that he can readily distinguish the attribute from the many sources of specific and error variance.

Piaget has, of course, called attention to types of reasoning items that have been omitted from Binet-type tests. It is highly probable that a better Binet could be constructed today with full knowledge of Piaget's contributions, but it is highly unlikely that educators are going to discover the key to curriculum construction and to classroom methods from Piaget while disavowing the importance of intelligence.

There are also good data to suggest that still other kinds of items could be added to the Binet-type test without detracting from and perhaps adding to the effectiveness with which general intellectual ability is measured. It is highly probable that most of the traditional Binet items are needlessly academic in nature from the point of view of measuring general ability. If Binet had been concerned with success in apprenticeships as well as success in school, the Binet test might have looked somewhat, though not radically, different from the way it does today.

Not only was intelligence treated rather lightly in the report, but individual differences in intelligence were completely ignored. For that matter, individual differences in the other characteristics of youth were ignored also. This is a major omission. Individual differences in general intellectual ability are very large and are associated with a large chunk of the variance in academic outcomes. Educational methods, in their totality, are associated with much smaller chunks of outcome variance. The egalitarian philosophies recently so much in vogue--though how these are reconciled with the popularity of Piaget is a matter that is impossible to understand--cannot abolish facts.

If students were assigned at random to classrooms, from 70 to 140 would not be highly improbable for a range of I.Q.s (The range is not symmetrical about 100 because the lower I.Q.s would be in institutions or in special classes. While 140 is not an upper limit, larger values are too improbable for this discussion.) At the chronological age of 6, the mental ages would range from 4.2 to 8.4; 6 years later the range would be from 8.4 to 16.8. Differences among children continue to

increase after the age of 12, but the utility of the mental scale decreases so that other units of measurement must be used for older students. Age 18 is a convenient but somewhat arbitrary cut-off. Mental age is ever so much more highly correlated with typical school activities than chronological age. It is completely impossible for a teacher to handle these ranges of mental ages in a single classroom with a single curriculum. Some variation of tracking, in spite of its bad name, is essential.

It is true that tracking has been abused. For one thing, a single grouping has frequently been used for all academic learning. This ignores variations in patterns of achievement. Second, assignment to a track has been too rigid. Measures of general ability do not show perfect stability from grade to grade even after allowing for errors of measurement. Optimum tracking would be completely individualized; other systems that approach this ideal closely should also be effective. The neighborhood school, with neighborhoods defined very largely by the socio-economic status of the parents, is one solution to the necessity for some form of tracking, but in and of itself is not a highly effective solution. The status of families is insufficiently correlated with the abilities of children. On the other hand, bussing typically increases the heterogeneity of pupil abilities in a school, while segregation by color or tracking by color in the classrooms of such schools is only a small step toward greater homogeneity. It has other defects as well.

It should also be mentioned, while on the subject of tracking, that there is a great deal of very naive research in the literature on this subject. Many comparisons of tracking have been flawed by the use of the same curriculum in the classrooms of both tracks. Successful tracking must provide an opportunity for fast groups to dig deeper into a subject matter, to explore more broadly, or both. A second flaw has been the fixed idea that the content of the final evaluation must be "fair" to both groups. How can one demonstrate that the fast group has learned more, either in depth, or breadth, or both without asking questions that would be irrelevant to the curriculum content for the slow group? It is practically self-evident that tracking benefits the faster group and that a classroom integrated for all levels

of ability penalizes the slower children unless the curriculum is pitched at or only slightly above their level. In the latter situation, the faster group is penalized.

I am not expert with respect to individual differences in interests, attitudes, personality traits, and physiological attributes, but I do know that individual differences are very wide in all of these areas. They are also important in all areas. I do know, also, that the relationships between abilities, interests, and aspirations are not very high. Interest in medicine accompanied by a low intellectual level or interest in working with one's hands accompanied by a high level of abstract intelligence are quite common phenomena. It is at best very difficult for the schools to cope with the range of individual differences in their pupils, but the task is impossible when an attempt is made to develop all schools in a single pattern. Note, however, it would be just as unfortunate for the recommendations in the report on youth to be accepted universally as to be totally disregarded. Schools should offer a variety of programs arranged in a variety of ways. It would be tragic to force a budding mathematical genius to go out into the world of work part-time or to take several years between high school and college on a job. He should be encouraged to obtain his Ph.D. early, say 21, and he should be placed immediately in a job setting that will allow him to contribute to mathematics. Most mathematicians are "over the hill" at 30. Their most productive years are precious. But to impose the pattern desirable for the mathematical genius on most young people is even more tragic. A wide variety of educational options should be a primary goal. If we have to reject traditional academic standards for some schools or some curricula, so be it. But this does not involve rejection of traditional standards for all schools or all curricula.

What are the sources of individual differences? These are many and various, of course, but they can be categorized under the traditional headings of heredity and environment. A slightly different distinction would be between biological and psycho-social. Environmentalists do not understand the genetic mechanism and are afraid to admit the possibility that human traits may have a genetic basis. A

common misunderstanding is that genetically determined traits would constitute a basis for a fixed, rigid class structure. Hereditarians, on the other hand, make basically the same mistake; i. e., if a trait were determined largely by environmental pressures there would be more similarity between parents and offspring than is known to exist. They, in effect, would predict the same consequences from strong environmental influence that environmentalists predict from strong genetic influence--and equally erroneously. Only identical twins have identical genotypes while no two individuals, including identical twins, have experienced identical environmental influences. Lack of environmental and genetic identity insures differences between parents and offspring.

Geneticists have correctly stated that the genetic mechanism is a primary source of individual differences as well as a primary source of differences between parent and offspring. The genetic mechanism, in other words, is an important basis for human variability, both from individual to individual and from generation to generation. These are completely valid generalizations. Those egalitarians who reject the possibility of genetic contributions to human behavior do so on impatient, emotional grounds. The genetic mechanism is a great leveller, not a producer of human elites. The levelling effect does require a few generations, however, and thus a little patience.

Environmentalists, on the other hand, have not presented a theory which leads to the predictable consequences of the genetic theory. It should be apparent, however, that the learning mechanism, which effects the environmental influence on the developing offspring, has effects parallel to those of the genetic mechanism in many respects. It produces individual differences, because between person environments are never identical, within or between families, and it produces differences between parents and offspring, because between generation environments are never identical. While heredity and environment may also interact, there is no necessity to invoke substantial interaction effects in the absence of direct evidence because the linear combination of the two is sufficient to account for a very wide range of individual differences and a very wide range of divergence between parent and offspring. The schools cannot

deny individual differences, though these differences are frequently disregarded. It would be, on the other hand, both effective and democratic to recognize them.